Appendix A to the

Manure Management Plan Form

Contents

Appendix A

Appendix A1: Manure Production Per Space of Capacity [1]

		Daily		Yearly
Swine	**Space**	**Liquid, Pit* or Basin****	**Liquid, Lagoon*****	**Solid Manure**
Nursery, 25 lb.	1 head	0.2 gal	0.7 gal	0.34 tons
Grow-finish, 150 lb.				
Formed storage*				
Dry feed	1 head	1.2 gal		2.05 tons
Wet/dry feed	1 head	0.9 gal		2.05 tons
Earthen storage**	1 head	1.2 gal		2.05 tons
Lagoon***	1 head		4.1 gal	2.05 tons
Gestation, 400 lb.	1 head	3.0 gal	3.7 gal	2.77 tons
Sow & Litter, 450 lb.	1 crate	3.5 gal	7.5 gal	6.16 tons
Farrow-nursery	Per sow in breeding herd	2.2 gal	5.4 gal	6.09 tons
Farrow-finish	Per sow in breeding herd	9.4 gal	30 gal	12.25 tons

Dairy, Confined	**Space**	**Liquid, Pit* or Basin****	**Liquid, Lagoon*****	**Solid Manure**
Cows, 1200 & up lb.	1 head	18.0 gal	40.1 gal	14 tons
Heifers, 900 lb.	1 head	8.8 gal	29.9 gal	6.5 tons
Calves, 500 lb.	1 head	4.9 gal	16.5 gal	1.5 tons
Veal calves, 250 lb.	1 head	2.5 gal	8.2 gal	1.1 tons
Dairy herd	Per productive cow in herd	18.5 gal	59.8 gal	20 tons

Beef, Confined	**Space**	**Liquid, Pit* or Basin****	**Liquid, Lagoon*****	**Solid Manure**
Mature cows, 1000 lb.	1 head	7.2 gal	15.7 gal	12.23 tons
Finishing, 900 lb.	1 head	6.5 gal	13.1 gal	11.00 tons
Feeder calves, 500 lb.	1 head	3.6 gal	7.3 gal	6.11 tons

Poultry	**Space**	**Dry Manure**
Layer, cages	1000 head	10.5 tons
Broiler, litter	1000 head	9.00 tons
Turkeys, litter	1000 head	35.00 tons

* Formed manure storage structure
** Earthen manure storage basin
*** Anaerobic lagoon

[1] This table is from Table 5 of Chapter 567-65, Rules for Animal Feeding Operations.

Appendix A2: Annual Pounds of Nitrogen Per Space of Capacity [2]

Swine	Space	Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Nursery, 25 lb.	1 head	2	1	5
Grow-finish, 150 lb.				
*Formed storage**				
Dry feeders	1 head	21		29
Wet/dry feeders	1 head	19		29
*Earthen storage***	1 head	14		29
*Lagoon****	1 head		6	29
Gestation, 400 lb.	1 head	27	5	39
Sow & Litter, 450 lb.	1 crate	32	11	86
Farrow-nursery	Per sow in breeding herd	22	8	85
Farrow-finish	Per sow in breeding herd	150	44	172

Dairy, Confined	Space	Liquid, Pit* or Basin**	Liquid Lagoon***	Solid Manure
Cows, 1200 & up lb.	1 head	164	59	140
Heifers, 900 lb.	1 head	81	44	65
Calves, 500 lb.	1 head	45	24	15
Veal calves, 250 lb.	1 head	22	12	10
Dairy herd	Per productive cow in herd	169	87	180

Beef, Confined	Space	Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid, Manure
Mature cows, 1000 lb.	1 head	105	23	147
Finishing, 900 lb.	1 head	95	19	132
Feeder calves, 500 lb.	1 head	53	11	73

Poultry	Space	Dry Manure
Layer, cages	1000 head	367
Broiler, litter	1000 head	585
Turkeys, litter	1000 head	1400

* Formed manure storage structure
** Earthen manure storage basin
*** Anaerobic lagoon

2 This table is from Table 3 of Chapter 567-65, Rules for Animal Feeding Operations. Source: PM 1811, Managing Manure Nutrients for Crop Production

Appendix A3: Annual Pounds of Phosphorus (as P_2O_5) per Space of Capacity[3]

Swine	Space	Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Nursery, 25 lb.	1 head	1	0.7	3
Grow-finish, 150 lb.				
Formed storage*				
Dry feeders	1 head	15		18
Wet/dry feeders	1 head	13		18
Earthen storage**	1 head	10		18
Lagoon***	1 head		5	18
Gestation, 400 lb.	1 head	27	4	25
Sow & Litter, 450 lb.	1 crate	26	8	55
Farrow-nursery	Per sow in breeding herd	18	6	55
Farrow-finish	Per sow in breeding herd	109	33	110

Dairy, Confined	Space	Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Cows, 1200 & up lb	1 head	78	44	42
Heifers, 900 lb.	1 head	38	33	20
Calves, 500 lb.	1 head	22	18	5
Veal calves, 250 lb.	1 head	10	9	3
Dairy herd-per productive	cow in herd	80	66	80

Beef, Confined	Space	Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Mature cows, 1000 lb.	1 head	66	17	73
Finishing, 900 lb.	1 head	59	14	66
Feeder calves, 500 lb.	1 head	33	8	37

Poultry	Space	Dry Manure
Layer, cages	1000 head	840
Broiler, litter	1000 head	585
Turkeys, litter	1000 head	1400

* Formed manure storage structure
** Earthen manure storage basin
*** Anaerobic lagoon

3. Source: Pm-1811 Managing Manure Nutrients for Crop Production

542-4000 new 7-2004

Appendix A4: Nutrients in Animal Manure

(modified from Table 2 of ISU Extension Pm-1811)

Management System	N	P_2O_5	K_2O	Management System	N	P_2O_5	K_2O
Liquid, Pit	**lbs./1,000 gallon**			**Solid Manure (Bedded)**	**lbs./ton**		
Swine				**Swine—confined**			
Nursery, 25 lbs.	35	20	20	Nursery, 25 lbs.	14	9	11
Grow-finish, 150 lbs (wet/dry)	58	40	45	Grow-finish, 150 lbs.	14	9	11
Grow-finish, 150 lbs. (dry feed)	50	42	30	Gestation, 400 lbs	14	9	11
Grow-finish, 150 lbs. (earthen)	32	22	20	Sow and litter, 450 lbs.	14	9	11
Gestation, 400 lbs.	25	25	25	Farrow-nursery	14	9	11
Sow and litter [1], 450 lbs.	25	20	15	Farrow-finish	14	9	11
Farrow-nursery [2]	27	23	22				
Farrow-finish[3]	44	32	24				
Dairy—confined				**Dairy—confined**			
Cows, 1,200 lbs. or more	25	12	11	Cows, 1,200 lbs. or more	12	6	12
Heifers, 900 lbs.	25	12	11	Heifers, 900 lbs.	12	6	12
Calves, 500 lbs.	25	12	11	Calves, 500 lbs.	12	6	12
Veal calves, 250 lbs.	25	12	11	Veal calves, 250 lbs.	12	6	12
Dairy herd[4]	25	12	11	Dairy herd	12	6	12
Beef—confined				**Beef—confined**			
Mature cows, 1,000 lbs.	40	25	35	Mature cows, 1,000 lbs.	12	6	12
Finishing, 900 lbs.	40	25	35	Finishing, 900 lbs.	12	6	12
Feeder calves, 500 lbs.	40	25	35	Feeder calves, 500 lbs.	12	6	12
Lagoon [5]				**Poultry**			
(all animals)	4	3	4	Layer, caged, 4 lbs. [6]	35	80	50
				Broiler, litter, 2 lbs.	65	65	45
				Turkeys, litter, 10 lbs.	40	40	25
Open Lot Runoff							
Earthen lots (liquids)				**Open lot (solids, scraped)**			
Beef, 400 sq. ft./hd.	3	1	6	Beef, 400 sq. ft./hd.	22	16	14
Dairy, 1,000 sq. ft./hd.	3	1	6	Dairy, 1,000 sq. ft./hd.	11	6	11
Swine, 50 sq. ft./hd.	3	1	6	Swine, 50 sq. ft./hd.	15	14	9
Concrete lots (liquids)							
Beef, 400 sq. ft./hd.	6	2	7				
Dairy, 1,000 sq. ft./hd.	6	2	7				
Swine, 50 sq. ft./hd.	15	5	10				

[1] Sow and litter figures are per farrowing crate.

[2] Farrow-nursery figures are per sow in the breeding herd and include one farrowing sow, five gestation sows, and nine nursery pig spaces.

[3] Farrow-finish figures are per sow in the breeding herd and include one farrowing sow, five gestation sows, nine nursery pigs, and 36 finishing pig spaces.

[4] Per productive cow in the herd; includes lactating cow, 330 days; dry cow, 35 days; heifer, 222 days; and calf, 165 days.

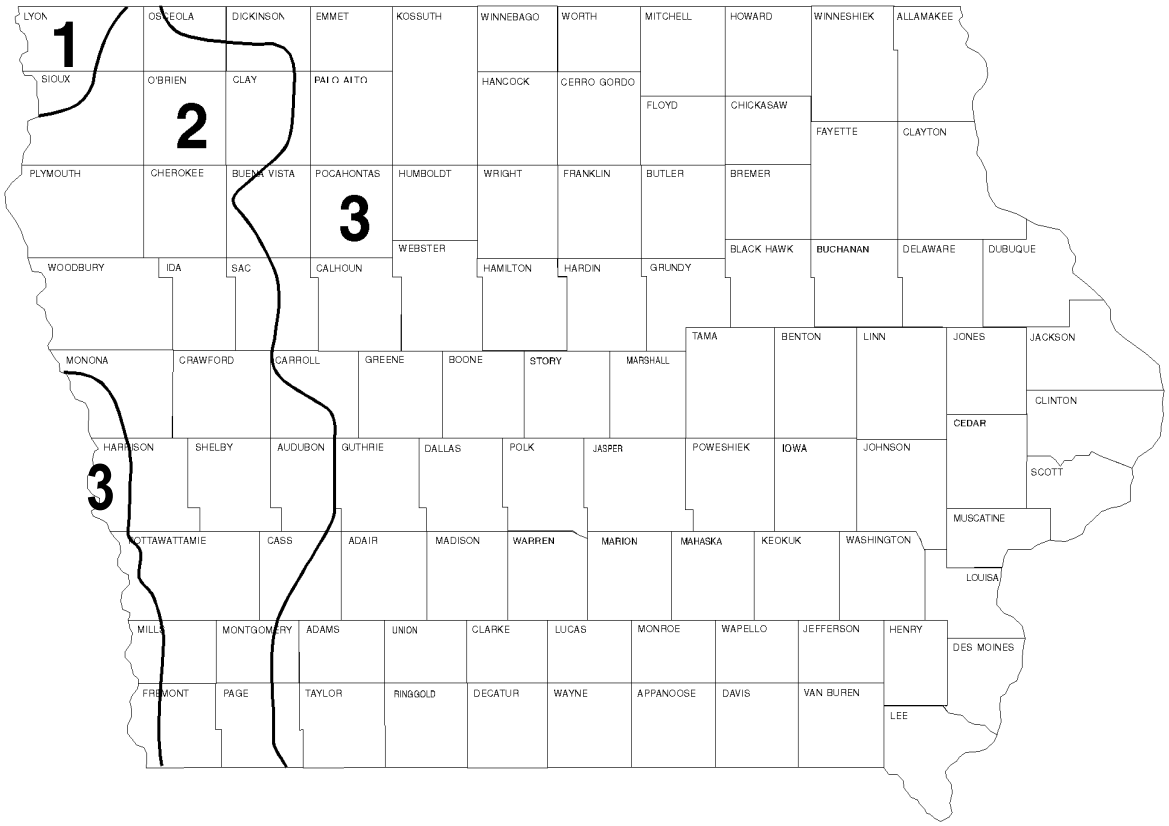
[5] Weights assumed: beef, 1,000 pounds; dairy, 1,200 pounds; swine, 150 pounds.

[6] Wet basis at 41 percent moisture.

Appendix A5: Crop Nitrogen Usage Rate Factors for Various Crops [3]

Corn	Zone 1	0.9 lbs/bu
	Zone 2	1.1 lbs/bu
	Zone 3	1.2 lbs/bu
Corn silage		7.5 lbs/ton
Soybean		3.8 lbs/bu
Oats		0.75 lbs/bu
Alfalfa		50.0 lbs/ton
Wheat		1.3 lbs/bu
Smooth bromegrass		40.0 lbs/ton
Sorghum-sudan		40.0 lbs/ton
Orchardgrass		38.0 lbs/ton
Tall fescue		38.0 lbs/ton
Switchgrass		21.0 lbs/ton
Vetch		56.0 lbs/ton
Red clover		43.0 lbs/ton
Perennial ryegrass		24.0 lbs/ton
Timothy		25.0 lbs/ton
Wheat straw		13.0 lbs/ton
Oat straw		12.0 lbs/ton

The following map outlines the three zones for the corn nitrogen usage rates indicated in the Table 4. Zone 1 corresponds to the Moody soil association. Zone 2 corresponds to the Marshall, Monona-Ida-Hamburg, and Galva-Primghar-Sac soil associations. Zone 3 corresponds to the remaining soil associations.



[3] Appendix A5 and the accompanying map are from Table 4 in Appendix B of Chapter 567-65.

Appendix A6: Nutrient Removal for Iowa Crops[4]

		Pounds/Unit		
Crop	**Units**	**N**	**P_2O_5**	**K_2O**
Corn	bu.	-	0.375	0.3
Corn Silage	ton (65% H_2O)	-	3.5	8.0
Corn Silage	bu. grain equivalent	-	0.55	1.25
Soybean	bu.	3.8	0.8	1.5
Alfalfa	ton	50	12.5	40
Oat and Straw	bu.	0.75	0.4	1.0
Wheat	bu.	1.3	0.6	0.3
Smooth bromegrass	ton	40	9	47
Orchardgrass	ton	38	14	68
Tall fescue	ton	38	12	66
Switchgrass	ton	21	12	66
Sorghum-sudan	ton	40	12	38
Vetch	ton	56	12	47
Red clover	ton	43	12	35
Perennial ryegrass	ton	24	12	34
Timothy	ton	25	9	32
Wheat straw	ton	13	4	25
Oat straw	ton	12	5	33

Appendix A7: Nitrogen Application Losses

Application Method	Application Loss Factor[5]
Knifed in or soil injection of liquid manure	0.98
Surface apply liquid or solid (dry) manure with incorporation within 24 hours	0.95
Surface apply liquid or solid (dry) manure with incorporation after 24 hours	0.80
Surface apply liquid manure with no incorporation	0.75
Surface apply solid (dry) manure with no incorporation	0.70
Irrigate liquid manure with no incorporation	0.60

4. Appendix A6 is from PM 1688: General Guide for Crop Nutrient Recommendations in Iowa
5. Percent of applied nitrogen remaining after deducting application losses

Appendix A8: Iowa Ag Statistics

County Corn and Soybean Yield Averages, 2001 - 2005

	Corn			Soybeans		
Counties	5 yr. avg. yield bu./a	5 yr. ave. yield + 10% bu./a	Avg. yield of 4 highest bu./a	5 yr. avg. yield bu./a	5 yr. ave. yield + 10% bu./a	Avg. yield of 4 highest bu./a
Adair	150.8	165.9	156.7	43.1	47.4	46.9
Adams	140.2	154.3	145.2	42.6	46.9	46.4
Allamakee	158.5	174.3	162.4	44.7	49.2	48.0
Appanoose	137.4	151.2	144.3	42.0	46.2	44.7
Audubon	153.9	169.3	160.2	45.2	49.7	48.8
Benton	169.6	186.5	171.9	47.0	51.7	51.3
Black Hawk	169.9	186.9	174.6	45.5	50.1	50.8
Boone	176.0	193.6	181.5	46.3	50.9	49.2
Bremer	175.1	192.6	180.7	46.0	50.6	51.6
Buchanan	170.2	187.2	172.9	43.9	48.3	48.4
Buena Vista	168.3	185.1	174.3	46.3	50.9	49.9
Butler	173.3	190.7	177.2	44.5	49.0	49.6
Calhoun	167.5	184.3	173.4	45.3	49.8	48.4
Carroll	166.8	183.5	172.9	47.7	52.5	50.7
Cass	151.1	166.2	157.2	44.0	48.4	47.6
Cedar	174.6	192.1	182.2	47.1	51.8	49.8
Cerro Gordo	165.8	182.4	170.6	42.9	47.2	46.4
Cherokee	169.9	186.9	174.9	51.5	56.7	54.4
Chickasaw	164.3	180.8	170.4	42.0	46.2	46.8
Clarke	134.6	148.0	139.7	39.2	43.1	42.4
Clay	161.4	177.5	167.6	43.5	47.9	45.8
Clayton	168.6	185.4	172.6	49.4	54.3	52.4
Clinton	161.5	177.7	172.7	44.9	49.4	48.1
Crawford	161.1	177.3	167.0	47.2	51.9	50.9
Dallas	161.7	177.9	168.3	45.3	49.8	48.6
Davis	142.1	156.3	148.8	41.2	45.3	43.3
Decatur	143.4	157.7	150.1	41.2	45.3	44.9
Delaware	173.0	190.3	176.5	47.4	52.1	51.8
Des Moines	160.7	176.8	165.1	47.0	51.7	49.7
Dickinson	158.8	174.7	166.1	43.0	47.3	45.1
Dubuque	170.9	188.0	174.4	48.8	53.6	52.5
Emmet	163.0	179.3	171.0	43.0	47.3	44.9
Fayette	169.1	186.0	173.1	44.9	49.4	49.9

updated 3/2006

Appendix A8: Iowa Ag Statistics

County Corn and Soybean Yield Averages, 2001 - 2005

	Corn			Soybeans		
Counties	5 yr. avg. yield bu./a	5 yr. ave. yield + 10% bu./a	Avg. yield of 4 highest bu./a	5 yr. avg. yield bu./a	5 yr. ave. yield + 10% bu./a	Avg. yield of 4 highest bu./a
Floyd	167.2	183.9	171.7	43.1	47.4	47.4
Franklin	173.8	191.2	178.9	44.4	48.8	47.6
Fremont	144.5	159.0	156.5	44.1	48.5	46.4
Greene	169.4	186.4	176.6	46.2	50.8	48.5
Grundy	176.9	194.6	183.7	50.6	55.6	54.0
Guthrie	149.4	164.3	154.8	42.4	46.6	46.2
Hamilton	176.7	194.4	180.0	45.7	50.3	48.6
Hancock	168.2	185.0	174.0	44.6	49.1	47.3
Hardin	177.5	195.2	182.4	46.7	51.4	49.9
Harrison	155.1	170.6	159.5	42.0	46.2	44.1
Henry	159.2	175.1	163.3	46.5	51.1	49.2
Howard	158.2	174.0	165.2	40.6	44.6	44.1
Humboldt	173.0	190.3	180.1	44.8	49.2	47.5
Ida	168.1	184.9	173.5	48.1	52.9	51.0
Iowa	166.4	183.0	171.2	46.1	50.8	49.9
Jackson	153.1	168.5	160.4	45.7	50.3	48.9
Jasper	178.5	196.3	184.4	49.4	54.4	53.8
Jefferson	146.6	161.2	149.6	43.2	47.5	46.0
Johnson	160.7	176.8	166.9	44.6	49.0	47.8
Jones	164.4	180.9	168.5	46.3	50.9	49.8
Keokuk	156.7	172.4	162.2	44.4	48.8	47.6
Kossuth	167.6	184.4	175.0	44.1	48.5	46.7
Lee	147.7	162.5	152.3	44.7	49.2	46.8
Linn	165.7	182.2	169.1	44.2	48.6	48.0
Louisa	151.4	166.5	156.5	43.2	47.5	46.6
Lucas	137.6	151.4	142.4	40.0	44.0	42.8
Lyon	166.7	183.4	170.6	47.8	52.5	50.2
Madison	152.0	167.2	156.4	43.4	47.8	47.3
Mahaska	165.4	181.9	171.1	47.6	52.3	50.0
Marion	156.0	171.6	160.0	44.7	49.1	48.5
Marshall	178.7	196.6	185.2	49.9	54.9	54.3
Mills	144.6	159.0	153.2	42.4	46.6	45.7
Mitchell	168.2	185.1	173.9	42.8	47.1	45.7

Appendix A8: Iowa Ag Statistics

County Corn and Soybean Yield Averages, 2001 - 2005

	Corn			Soybeans		
Counties	5 yr. avg. yield bu./a	5 yr. ave. yield + 10% bu./a	Avg. yield of 4 highest bu./a	5 yr. avg. yield bu./a	5 yr. ave. yield + 10% bu./a	Avg. yield of 4 highest bu./a
Monona	146.9	161.6	151.7	41.5	45.7	43.0
Monroe	145.8	160.4	153.3	40.4	44.4	44.5
Montgomery	149.0	163.9	153.9	44.2	48.6	47.6
Muscatine	160.9	177.0	167.3	45.6	50.2	48.2
O Brien	167.9	184.7	172.0	48.9	53.8	51.0
Osceola	160.9	177.0	169.4	46.2	50.8	49.2
Page	140.8	154.9	151.1	42.8	47.1	46.0
Palo Alto	167.8	184.5	173.4	42.9	47.1	45.2
Plymouth	163.7	180.0	169.9	45.8	50.4	47.8
Pocahontas	170.0	187.0	178.6	44.3	48.7	46.9
Polk	169.6	186.5	174.8	44.8	49.3	47.9
Pottawattamie	153.2	168.5	159.7	45.3	49.9	49.2
Poweshiek	172.4	189.7	178.0	48.3	53.1	52.5
Ringgold	129.7	142.7	135.9	41.6	45.7	45.3
Sac	168.9	185.8	173.0	47.3	52.0	51.2
Scott	178.1	195.9	185.4	49.8	54.8	52.8
Shelby	154.0	169.4	158.9	46.4	51.1	49.9
Sioux	173.7	191.1	177.1	51.4	56.6	53.8
Story	173.5	190.9	179.3	46.1	50.7	49.6
Tama	173.5	190.9	177.9	49.1	54.0	53.6
Taylor	134.5	148.0	139.4	42.3	46.6	45.7
Union	138.8	152.6	146.8	42.5	46.8	46.7
Van Buren	137.8	151.6	141.7	41.6	45.8	43.5
Wapello	144.8	159.3	149.0	42.4	46.6	45.5
Warren	151.1	166.2	154.9	44.2	48.6	48.4
Washington	162.4	178.6	166.0	46.0	50.6	49.3
Wayne	139.8	153.8	146.3	41.6	45.7	45.3
Webster	178.6	196.4	184.6	45.7	50.2	48.2
Winnebago	165.4	182.0	173.8	43.2	47.6	45.2
Winneshiek	160.4	176.4	167.5	43.5	47.9	46.5
Woodbury	154.8	170.3	160.3	43.2	47.5	45.1
Worth	163.1	179.4	170.7	43.2	47.5	45.8
Wright	170.7	187.7	176.9	44.3	48.8	46.9

Appendix A9: Chapter 567-- 65. 16 and 567-- 65.17 Rules for Animal Feeding Operations

Please note: Manure management plans that include the phosphorus index will be phased in between the fall of 2004 and 2008, depending upon the date that the original MMP was submitted to the DNR. See 65.17(1)"d" below for the phase in schedule.

Disclaimer: Producers should consult Chapter 65 of the Iowa Administrative Code for more information and the actual wording of rules governing animal feeding operations. Consult Chapter 459 of the Iowa Code for actual wording of the laws governing animal feeding operations in Iowa.

567—65.16(455B) Manure management plan requirements.

65.16(1) In accordance with Iowa Code section 455B.203 as amended by 2002 Iowa Acts, chapter 1137, section 38, the following persons are required to submit manure management plans to the department, including an original manure management plan and an updated manure management plan, as required by this rule:
a. An applicant for a construction permit for a confinement feeding operation. However, a manure management plan shall not be required of an applicant for an egg washwater storage structure.
b. The owner of a confinement feeding operation, other than a small animal feeding operation, if one of the following applies:
(1) The confinement feeding operation was constructed or expanded after May 31, 1985, regardless of whether the confinement feeding operation structure was required to have a construction permit.
(2) The owner constructs a manure storage structure, regardless of whether the person is required to be issued a permit for the construction pursuant to Iowa Code section 455B.200A as amended by 2002 Iowa Acts, chapter 1137, sections 28 and 29, or whether the person has submitted a prior manure management plan.
c. A person who applies manure in Iowa that was produced in a confinement feeding operation, other than a small operation, located outside of Iowa.
d. A research college is exempt from this subrule and the manure management plan requirements of rule 65.17(459) for research activities and experiments performed under the authority of the research college and related to animal feeding operations.

65.16(2) Effective February 13, 2002, an owner of a proposed confinement feeding operation who is required to file a manure management plan pursuant to paragraph 65.16(1)*"b"* shall submit the confinement feeding operation's manure management plan to the department at least 30 days before the construction of an animal feeding operation structure begins, as that term is defined in subrules 65.8(1) and 65.8(2). After the manure management plan has been received by the department, the department will date-stamp the plan as received and provide written confirmation of receipt to the owner. In addition to the content requirements specified in rule 65.17(459), the owner shall include:
a. Documentation that the board of supervisors or auditor of the county where the confinement feeding operation is proposed to be located received a copy of the plan.
b. Information (e.g., maps, drawings, aerial photos) that clearly shows the intended location of the animal feeding operation structures and locations and animal weight capacities of any other confinement feeding operations within a distance of 2,500 feet in which the owner has an ownership interest or which the owner manages.

65.16(3) Scope of manure management plan; updated plans; annual compliance fee.
a. Each confinement feeding operation required to submit a manure management plan shall be covered by a separate manure management plan.

b. The owner of a confinement feeding operation who is required to submit a manure management plan under this rule shall submit an updated manure management plan on an annual basis to the department. The updated plan must reflect all amendments made during the period of time since the previous manure management plan submission. The owner of the animal feeding operation shall also submit the updated manure management plan on an annual basis to the board of supervisors of each county where the confinement feeding operation is located and to the board of supervisors of each county where manure from the confinement feeding operation is land-applied. If the owner of the animal feeding operation has not previously submitted a manure management plan to the board of supervisors of each county where the confinement feeding operation is located and each county where manure is land-applied, the owner must submit a complete manure management plan to each required county. The county auditor or other county official or employee designated by the county board of supervisors may accept the updated plan on behalf of the board. The updated plan shall include documentation that the county board of supervisors or other designated county official or employee received the manure management plan update. The department will stagger the dates by which the updated manure management plans are due and will notify each confinement feeding operation owner of the date on which the updated manure management plan is due. To satisfy the requirements of an updated manure management plan, an owner of a confinement feeding operation must submit one of the following:
(1) A complete manure management plan;
(2) A department-approved document stating that the manure management plan submitted in the prior year has not changed; or
(3) A department-approved document listing all the changes made since the previous manure management plan was submitted and approved.
c. An annual compliance fee of $0.15 per animal unit at the animal feeding operation shall accompany an annual manure management plan update submitted to the department for approval. The annual compliance fee is based on the animal unit capacity of the confinement feeding operation stated in the updated annual manure management plan submission. If the person submitting the manure management plan is a contract producer, as provided in Iowa Code chapter 202, the active contractor shall pay the annual compliance fee.

65.16(4) The department shall review and approve or disapprove all complete manure management plans within 60 days of the date they are received.

65.16(5) Manure shall not be removed from a manure storage structure, which is part of a confinement feeding operation required to submit a manure management plan, until the department has approved the plan. As an exception to this requirement, until July 1, 2002, the owner of a confinement feeding operation may remove and apply manure from a manure storage structure in accordance with a manure management plan submitted to the department prior to September 18, 2001, but which has not been approved within the required 60-day period. Manure shall be applied in compliance with rule 65.2(455B).

\65.16(6) All persons required to submit a manure management plan to the department shall also pay to the department an indemnity fee as required in Iowa Code section 455J.3 except those operations constructed prior to May 31, 1995, which were not required to obtain a construction permit.

65.16(7) Any person submitting an original manure management plan must also pay to the department a manure management plan filing fee of $250. This fee shall be included with each original manure management plan being submitted. If the confinement feeding operation is required to obtain a construction permit and to submit an original manure management plan as part of the construction permit requirements, the applicant must pay the manure management plan filing fee together with the construction permit application fee, which total $500.

567—65.17(459) Manure management plan content requirements. All manure management plans are to be submitted on forms or electronically as prescribed by the department. The plans shall include all of the information specified in Iowa Code section 459.312 and as described below.

65.17(1) *General.*
a. A confinement feeding operation that is required to submit a manure management plan to the department shall not apply manure in excess of the nitrogen use levels necessary to obtain optimum crop yields. When a phosphorus index is required in a manure management plan as provided in 65.17(1)*"d,"* a confinement feeding operation shall not apply manure in excess of the rates determined in conjunction with the phosphorus index. Information to complete the required calculations may be obtained from the tables in this chapter, actual testing samples or from other credible sources including, but not limited to, Iowa State University, the United States Department of Agriculture (USDA), a licensed professional engineer, or an individual certified as a crop consultant under the American Registry of Certified Professionals in Agronomy, Crops, and Soils (ARCPACS) program, the Certified Crop Advisors (CCA) program, or the Registry of Environmental and Agricultural Professionals (REAP) program.
b. Manure management plans shall comply with the minimum manure control requirements of 65.2(455B) and the requirements for land application of manure in 65.3(455B).
c. Manure management plans shall include all of the following:
(1) The name of the owner and the name of the confinement feeding operation, including mailing address and telephone number.
(2) The name of the contact person for the confinement feeding operation, including mailing address and telephone number.
(3) The location of the confinement feeding operation identified by county, township, section, 1/4 section and, if available, the 911 address.
(4) The animal unit capacity of the confinement feeding operation and, if applicable, the animal weight capacity.
d. A person who submits a manure management plan shall include a phosphorus index as part of the manure management plan as follows:
(1) A person who submitted an original manure management plan prior to April 1, 2002, shall submit a phosphorus index with the first manure management plan update on and after August 25, 2008.
(2) A person who submitted an original manure management plan on or after April 1, 2002, but prior to October 25, 2004, shall submit a phosphorus index with the first manure management plan update on and after August 25, 2006.
(3) A person who submits an original manure management plan on and after October 25, 2004, shall include the phosphorus index as part of the original manure management plan and manure management plan updates.

65.17(2) *Manure management plans for sales of manure.* Selling manure means the transfer of ownership of the manure for monetary or other valuable consideration. Selling manure does not include a transaction where the consideration is the value of the manure, or where an easement, lease or other agreement granting the right to use the land only for manure application is executed.
a. Confinement feeding operations that will sell dry manure as a commercial fertilizer or soil conditioner regulated by the Iowa department of agriculture and land stewardship (IDALS) under Iowa Code chapter 200 or 200A shall submit a copy of their site-specific IDALS license or documentation that manure will be sold pursuant to Iowa Code chapter 200 or 200A, along with the departmentapproved manure management plan form for sales of dry manure. Operations completely covered by this paragraph are not required to meet other manure management plan requirements in this rule.
b. A confinement feeding operation not fully covered by paragraph *"a"* above and that has an established practice of selling manure, or a confinement feeding operation that contains an animal species for which elling manure is a common practice, shall submit a manure management plan that includes the following:
(1) Until a phosphorus index is required as part of the manure management plan, an estimate of the number of acres required for manure application shall be calculated by dividing the total nitrogen available to be applied from the confinement feeding operation by the crop usage rate. Crop usage rate may be estimated by using a corn crop usage rate factor and an estimate of the optimum crop yield for the property in the vicinity of the confinement feeding operation.
(2) When a phosphorus index is required as part of the manure management plan, an estimate of the number of acres required for manure application shall be calculated by one of the following methods:

1. Dividing the total phosphorus (as P2O5) available to be applied from the confinement feeding operation by the corn crop removal of phosphorus. The corn crop removal of phosphorus may be estimated by using the phosphorus removal rate in Table 4a at the end of this chapter and an estimate of the optimum crop yieldfor the property in the vicinity of the operation.
2. Totaling the quantity of manure that can be applied to each available field based on application rates determined in conjunction with the phosphorus index in accordance with 65.17(17), and ensuring that the total quantity that can be applied is equal to or exceeds the manure annually generated at the operation.
(3) The total nitrogen available to be applied from the confinement feeding operation.
(4) The total phosphorus (as P2O5) available to be applied from the confinement feeding operation if the phosphorus index is required in accordance with 65.17(1)*"d."*
(5) An estimate of the annual animal production and manure volume or weight produced.
(6) A manure sales form, if manure will be sold, shall include the following information:
1. A place for the name and address of the buyer of the manure.
2. A place for the quantity of manure purchased.
3. The planned crop schedule and optimum crop yields.
4. A place for the manure application methods and the timing of manure application.
5. A place for the location of the field including the number of acres where the manure will be applied.
6. A place for the manure application rate.
7. When a phosphorus index is required as part of a manure management plan in accordance with 65.17(1)*"d,"* a place for a phosphorus index of each field receiving manure, as defined in 65.17(17)*"a,"* including the factors used in the calculation. A copy of the NRCS phosphorus index detailed report shall satisfy the requirement to include the factors used in the calculation.
(7) Statements of intent if the manure will be sold. The number of acres indicated in the statements of intent shall be sufficient according to the manure management plan to apply the manure from the confinement feeding operation. The permit holder for an existing confinement feeding operation with a construction permit may submit past records of manure sales instead of statements of intent. The statements of intent shall include the following information:
1. The name and address of the person signing the statement.
2. A statement indicating the intent of the person to purchase the confinement feeding operation's manure.
3. The location of the farm where the manure can be applied including the total number of acres available for manure application.
4. The signature of the person who may purchase the confinement feeding operation's manure.
(8) The owner shall maintain in the owner's records a current manure management plan and copies of all of the manure sales forms; the sales forms must be completed and signed by each buyer of the manure and the applicant, and the copies must be maintained in the owner's records for three years after each sale. Effective August 25, 2006, the owner shall maintain in the owner's records copies of all of the manure sales forms for five years after each sale. An owner of a confinement feeding operation shall not be required to maintain current statements of intent as part of the manure management plan.

65.17(3) *Manure management plan for nonsales of manure.* Confinement feeding operations that will not sell all of their manure shall submit the following for that portion of the manure which will not be sold:
a. Calculations to determine the land area required for manure application.
b. The total nitrogen available to be applied from the confinement feeding operation.
c. The planned crop schedule and optimum crop yields.
d. Manure application methods and timing of the application.
e. The location of manure application.
f. An estimate of the annual animal production and manure volume or weight produced.
g. Methods, structures or practices that will be used to reduce soil loss and prevent surface water pollution.
h. Methods or practices that will be utilized to reduce odor if spray irrigation equipment is used to apply manure.
i. When a phosphorus index is required as part of the manure management plan in accordance with 65.17(1)*"d,"* the following are required:

(1) The total phosphorus (as P2O5) available to be applied from the confinement feeding operation.
(2) A phosphorus index of each field in the manure management plan, as defined in 65.17(17)*"a,"* including the factors used in the calculation. A copy of the NRCS phosphorus index detailed report shall satisfy the requirement to include the factors used in the calculation.

65.17(4) *Manure management plan calculations to determine land area required for manure application.*
a. The number of acres needed for manure application for each year of the crop schedule shall be determined as follows:
(1) Until a phosphorus index is required in accordance with 65.17(1)*"d,"* the requirements of 65.17(18) shall be followed.
(2) When a phosphorus index is required in accordance with 65.17(1)*"d,"* the requirements of 65.17(17) shall be followed.
b. Operations evaluated with the master matrix pursuant to 65.10(3) that claim points for additional separation distance for the land application of manure must maintain those distances for each year of the manure management plan.
c. Nitrogen in addition to that allowed in the manure management plan may be applied up to the amounts, indicated by soil or crop nitrogen test results, necessary to obtain the optimum crop yield.

65.17(5) *Total nitrogen and total phosphorus (as P2O5) available from the confinement feeding operation.*
a. To determine the nitrogen available to be applied per year, the factors in Table 3, "Annual Pounds of Nitrogen Per Space of Capacity," multiplied by the number of spaces shall be used. To determine total phosphorus (as P2O5) available to be applied per year, the factors in Table 3a, "Annual Pounds of Phosphorus Per Space of Capacity," multiplied by the number of spaces shall be used. If the tables are not used to determine the nitrogen or phosphorus available to be applied, other credible sources for standard table values or the actual nitrogen and phosphorus content of the manure may be used. The actual nitrogen and phosphorus content shall be determined by a laboratory analysis along with measured volume or weight of manure from the manure storage structure or from a manure storage structure with design and management similar to the confinement feeding operation's manure storage structure.
b. If an actual sample is used to represent the nutrient content of manure, the sample shall be taken in accordance with Iowa State University extension publication PM 1558, "Management Practices: How to Sample Manure for Nutrient Analysis." The department may require documentation of the manure sampling protocol or take a split sample to verify the nutrient content of the operation's manure.

65.17(6) *Optimum crop yield and crop schedule.*
a. To determine the optimum crop yield, the applicant may either exclude the lowest crop yield for the period of the crop schedule in the determination or allow for a crop yield increase of 10 percent. In using these methods, adjustment to update yield averages to current yield levels may be made if it can be shown that the available yield data is not representative of current yields. The optimum crop yield shall be determined using any of the following methods for the cropland where the manure is to be applied:
(1) Soil survey interpretation record. The plan shall include a map showing soil map units for the fields where manure will be applied. The optimum crop yield for each field shall be determined by using the weighted average of the soil interpretation record yields for the soils on the cropland where the manure is to be applied. Soil interpretation records from the Natural Resources Conservation Service shall be used to determine yields based on soil map units.
(2) USDA county crop yields. The plan shall use the county yield data from the USDA Iowa Agricultural Statistics Service.
(3) Proven yield methods. Proven yield methods may only be used if a minimum of the most recent three years of yield data for the crop is used. These yields can be proven on a field-by-field or farm-by-farm basis. Crop disaster years may be excluded when there is a 30 percent or more reduction in yield for a particular field or farm from the average yield over the most recent five years. Excluded years shall be replaced by the most recent nondisaster years. Proven yield data used to determine application rates shall be maintained with the

current manure management plan. Any of the following proven yield methods may be used:
1. Proven yields for USDA Farm Service Agency. The plan shall use proven yield data or verified yield data for Farm Service Agency programs.
2. Proven yields for multiperil crop insurance. Yields established for the purpose of purchasing multiperil crop insurance shall be used as proven yield data.
3. Proven yields from other methods. The plan shall use the proven yield data and indicate the method used in determining the proven yield.
b. Crop schedule. Crop schedules shall include the name and total acres of the planned crop on a field-by-field or farm-by-farm basis where manure application will be made. A map may be used to indicate crop schedules by field or farm. The planned crop schedule shall name the crop(s) planned to be grown for the length of the crop rotation beginning with the crop planned or actually grown during the year this plan is submitted or the first year manure will be applied. The confinement feeding operation owner shall not be penalized for exceeding the nitrogen or phosphorus application rate for an unplanned crop, if crop schedules are altered because of weather, farm program changes, market factor changes, or other unforeseeable circumstances.

65.17(7) *Manure application methods and timing.*
a. The manure management plan shall identify the methods that will be used to land-apply the confinement feeding operation's manure. Methods to land-apply the manure may include, but are not limited to, surface-apply dry with no incorporation, surface-apply liquids with no incorporation, surface-apply liquid or dry with incorporation within 24 hours, surface-apply liquid or dry with incorporation after 24 hours, knifed in or soil injection of liquids, or irrigated liquids with no incorporation.
b. The manure management plan shall identify the approximate time of year that land application of manure is planned. The time of year may be identified by season or month.

65.17(8) *Location of manure application.*
a. The manure management plan shall identify each farm where the manure will be applied, the number of acres that will be available for the application of manure from the confinement feeding operation, and the basis under which the land is available.
b. A copy of each written agreement executed with the owner of the land where manure will be applied shall be maintained with the current manure management plan. The written agreement shall indicate the acres on which manure from the confinement feeding operation may be applied and the length of the agreement. A written agreement is not required if the land is owned or rented for crop production by the owner of the confinement feeding operation.
c. If a present location becomes unavailable for manure application, additional land for manure application shall be identified in the current manure management plan prior to the next manure application period.

65.17(9) *Estimate of annual animal production and manure volume or weight produced.* Volumes or weights of manure produced shall be estimated based on the numbers of animals, species, and type of manure storage used. The plan shall list the annually expected number of production animals by species. The volume of manure may be estimated based on the values in Table 5 at the end of this chapter and submitted as a part of the plan. If the plan does not use the table to determine the manure volume, other credible sources for standard table values or the actual manure volume from the confinement feeding operation may be used.

65.17(10) *Methods to reduce soil loss and potential surface water pollution.* The manure management plan shall include an identification of the methods, structures or practices that will be used to prevent or diminish soil loss and potential surface water pollution during the application of manure. Until a phosphorus index is required in accordance with 65.17(1)*"d,"* the current manure management plan shall maintain a summary or copy of the conservation plan for the cropland where manure from the animal feeding operation will be applied if the manure will be applied on highly erodible cropland. The conservation plan shall be the conservation plan approved by the local soil and water conservation district or its equivalent. The summary of the conservation plan shall identify the methods, structures or practices that are contained in the conservation plan. When a phosphorus index is required in accordance with 65.17(1)*"d,"* the manure management plan shall indicate for each field in the plan the crop rotation, tillage practices and supporting practices used to

calculate sheet and rill erosion for the phosphorus index. A copy of the NRCS RUSLE2 profile erosion calculation record shall satisfy the requirement to indicate the crop rotation, tillage practices and supporting practices to calculate sheet and rill erosion. The plan shall also identify the highly erodible cropland where manure will be applied. The manure management plan may include additional information such as whether the manure will be injected or incorporated or the type of manure storage structure.

65.17(11) *Spray irrigation.* Requirements contained in subrules 65.3(2) and 65.3(3) regarding the use of spray irrigation equipment to apply manure shall be followed. A plan which has identified spray irrigation equipment as the method of manure application shall identify any additional methods or practices to reduce potential odor, if any other methods or practices will be utilized.

65.17(12) *Current manure management plan.* The owner of a confinement feeding operation who is required to submit a manure management plan shall maintain a current manure management plan at the site of the confinement feeding operation or at a residence or office of the owner or operator of the operation within 30 miles of the site. The plan shall include completed manure sales forms for a confinement feeding operation from which manure is sold. If manure management practices change, a person required to submit a manure management plan shall make appropriate changes consistent with this rule. If values other than the standard table values are used for manure management plan calculations, the source of the values used shall be identified.

65.17(13) *Record keeping.* Records shall be maintained by the owner of a confinement feeding operation who is required to submit a manure management plan. This recorded information shall be maintained for three years following the year of application or for the length of the crop rotation, whichever is greater. Effective August 25, 2006, records shall be maintained for five years following the year of application or for the length of the crop rotation, whichever is greater. Records shall be maintained at the site of the confinement feeding operation or at a residence or office of the owner or operator of the facility within 30 miles of the site. Records to demonstrate compliance with the manure management plan shall include the following:

a. Factors used to calculate the manure application rate:

(1) Optimum yield for the planned crop.

(2) Types of nitrogen credits and amounts.

(3) Remaining crop nitrogen needed.

(4) Nitrogen content and first-year nitrogen availability of the manure.

(5) Phosphorus content of the manure if required in accordance with 65.17(3)*"i."* If an actual sample is used, documentation shall be provided.

b. If phosphorus-based application rates are used, the following shall be included:

(1) Crop rotation.

(2) Phosphorus removed by crop harvest of that crop rotation.

c. Maximum allowable manure application rate.

d. Actual manure application information:

(1) Methods of application when manure from the confinement feeding operation was applied.

(2) Date(s) when the manure from the confinement feeding operation was applied.

(3) Location of the field where the manure from the confinement feeding operation was applied, including the number of acres.

(4) The manure application rate.

e. Effective August 25, 2005, date(s) and application rate(s) of commercial nitrogen and phosphorus on fields that received manure. However, if the date and application rate information is for fields which are not owned for crop production or which are not rented or leased for crop production by the person required to keep records pursuant to this subrule, an enforcement action for noncompliance with a manure management plan or the requirements of this subrule shall not be pursued against the person required to keep records pursuant to this subrule or against any other person who relied on the date and application rate in records required to be kept pursuant to this subrule, unless that person knew or should have known that nitrogen or phosphorus would be applied in excess of maximum levels set forth in paragraph 65.17(1)*"a."* If manure is applied to fields not owned, rented or leased for crop production by the person required to keep records pursuant to this subrule, that person shall obtain from the

person who owns, rents or leases those fields a statement specifying the planned commercial nitrogen and phosphorus fertilizer rates to be applied to each field receiving the manure.
f. When a phosphorus index is required in accordance with 65.17(1)*"d,"* a copy of the current soil test lab results for each field in the manure management plan.
g. For sales of manure under 65.17(2)*"b,"* record-keeping requirements of 65.17(2)*"b"*(8) shall be followed.

65.17(14) *Record inspection.* The department may inspect a confinement feeding operation at any time during normal working hours and may inspect the manure management plan and any records required to be maintained. As required in Iowa Code section 459.312(12), Iowa Code chapter 22 shall not apply to the records which shall be kept confidential by the department and its agents and employees. The contents of the records are not subject to disclosure except as follows:
a. Upon waiver by the owner of the confinement feeding operation.
b. In an action or administrative proceeding commenced under this chapter. Any hearing related to the action or proceeding shall be closed.
c. When required by subpoena or court order.

65.17(15) *Enforcement action.* An owner required to provide the department a manure management plan pursuant to this rule who fails to provide the department a plan or who is found in violation of the terms and conditions of the plan shall not be subject to an enforcement action other than assessment of a civil penalty pursuant to Iowa Code section 455B.191.

65.17(16) *Soil sampling requirements for fields where the phosphorus index must be used.* Soil samples shall be obtained from each field in the manure management plan at least once every four years. Each soil sample shall be analyzed for phosphorus and pH. The soil sampling protocol shall meet all of the following requirements:
a. Acceptable soil sampling strategies include, but are not limited to, grid sampling, management zone sampling, and soil type sampling. Procedural details can be taken from Iowa State University extension publication PM 287, "Take a Good Soil Sample to Help Make Good Decisions," NCR-13 Report 348, "Soil Sampling for Variable-Rate Fertilizer and Lime Application," or other credible soil sampling publications.
b. Each soil sample must be a composite of at least ten soil cores from the sampling area, with each core containing soil from the top six inches of the soil profile.
c. Each soil sample shall represent no more than ten acres. For fields less than or equal to 15 acres, only one soil sample is necessary.
d. Soil analysis must be performed by a lab enrolled in the IDALS soil testing certification program.
e. The soil phosphorus test method must be an appropriate method for use with the phosphorus index. If soil pH is greater than or equal to 7.4, soil phosphorus data from the Bray-1 extraction method is not acceptable for use with the phosphorus index.

65.17(17) *Use of the phosphorus index.* Manure application rates shall be determined in conjunction with the use of the Iowa Phosphorus Index as specified by the USDA Natural Resources Conservation Service (NRCS) Iowa Technical Note No. 25.
a. The phosphorus index shall be used on each individual field in the manure management plan. The fields must be contiguous and shall not be divided by a public thoroughfare or a water source as each is defined in this chapter. Factors to be considered when a field is defined may include, but are not limited to, cropping system, erosion rate, soil phosphorus concentration, nutrient application history, and the presence of site-specific soil conservation practices.
b. When sheet and rill erosion is calculated for the phosphorus index, the soil type used for the calculation shall be the most erosive soil map unit that is at least 10 percent of the total field area.
c. The average (arithmetic mean) soil phosphorus concentration of a field shall be used in the phosphorus index.
d. Soil phosphorus concentration data is considered valid for use in the phosphorus index if the data is four years old or less and meets the requirements of 65.17(16).

e. For an original manure management plan, previous soil sampling data that does not meet the requirements of 65.17(16) may be used in the phosphorus index if the data is four years old or less. In the case of fields for which soil sampling data is used that does not meet the requirements of 65.17(16), the fields must be soil-sampled according to the requirements of 65.17(16) no more than one year after the manure management plan is approved.

f. The following are the manure application rate requirements for fields that are assigned the phosphorus index site vulnerability ratings below as determined by the NRCS Iowa Technical Note No. 25 to the NRCS 590 standard rounded to the nearest one-hundredth:

(1) Very Low (0-1).

1. Manure shall not be applied in excess of a nitrogen-based rate in accordance with 65.17(18).
2. If, pursuant to 65.17(19), manure is applied at phosphorus-based rates within soil sampling periods on fields in the Very Low risk category, each soil sample may represent up to 20 acres for the next required soil sampling.

(2) Low (>1-2).

1. Manure shall not be applied in excess of a nitrogen-based rate in accordance with 65.17(18).
2. If, pursuant to 65.17(19), manure is applied at phosphorus-based rates within soil sampling periods on fields in the Low risk category, each soil sample may represent up to 20 acres for the next required soil sampling.

(3) Medium (>2-5).

1. Manure may be applied at a nitrogen-based rate in accordance with 65.17(18) if current or planned soil conservation and phosphorus management practices predict the rating of the field to be not greater than 5 for the next determination of the phosphorus index as required by 65.17(17)*"h"*(3).
2. Manure shall not be applied in excess of two times the phosphorus removed with crop harvest over the period of the crop rotation.
3. If, pursuant to 65.17(19), manure is applied at phosphorus-based rates within soil sampling periods on fields in the Medium risk category, each soil sample may represent up to 20 acres for the next required soil sampling.

(4) High (>5-15). Manure shall not be applied on a field with a rating greater than 5 and less than or equal to 15 until practices are adopted which reduce the phosphorus index to at least the Medium risk category. However, prior to December 31, 2008, fields with a phosphorus index greater than 5 and less than or equal to 10 may receive manure at a phosphorus-based rate in accordance with 65.17(19) if practices will be adopted to reduce the phosphorus index to the Medium risk category.

(5) Very High (>15). Manure shall not be applied on a field with a rating greater than 15.

g. Additional commercial fertilizer may be applied as follows on fields receiving manure:

(1) Phosphorus fertilizer may be applied in addition to phosphorus provided by the manure up to amounts recommended by soil tests and Iowa State University extension publication PM 1688, "General Guide for Crop Nutrient Recommendations in Iowa."

(2) Nitrogen fertilizer may be applied in addition to nitrogen provided by the manure to meet the remaining nitrogen need of the crop as calculated in the current manure management plan. Additional nitrogen fertilizer may be applied up to the amounts indicated by soil test nitrogen results or crop nitrogen test results as necessary to obtain the optimum crop yield.

h. Updating the phosphorus index.

(1) When any inputs to the phosphorus index change, an operation shall recalculate the phosphorus index and adjust the application rates if necessary.

(2) If additional land becomes available for manure application, the phosphorus index shall be calculated to determine the manure application rate before manure is applied.

*(*3) An operation must submit a complete manure management plan using a new phosphorus index for each field in the manure management plan a minimum of once every four years.

65.17(18) *Requirements for application of a nitrogen-based manure rate to a field.*

a. Nitrogen-based application rates shall be based on the total nitrogen content of the manure unless the calculations are submitted to show that nitrogen crop usage rates based on plant-available nitrogen have not been exceeded for the crop schedule submitted.

b. The correction factor for nitrogen losses shall be determined for the method of application by the following

or from other credible sources for nitrogen volatilization correction factors.
Knifed in or soil injection of liquids 0.98
Surface-apply liquid or dry with incorporation within 24 hours 0.95
Surface-apply liquid or dry with incorporation after 24 hours 0.80
Surface-apply liquids with no incorporation 0.75
Surface-apply dry with no incorporation 0.70
Irrigated liquids with no incorporation 0.60
c. Nitrogen-based application rates shall be based on the optimum crop yields as determined in 65.17(6) and crop nitrogen usage rate factor values in Table 4 at the end of this chapter or other credible sources.
d. A nitrogen-based manure rate shall account for legume production in the year prior to growing corn or other grass crops and shall account for any planned commercial fertilizer application.

65.17(19) *Requirements for application of a phosphorus-based manure rate to a field.*
a. Phosphorus removal by harvest for each crop in the crop schedule shall be determined using the optimum crop yield as determined in 65.17(6) and phosphorus removal rates of the harvested crop from Table 4a at the end of this chapter or other credible sources. Phosphorus crop removal shall be determined by multiplying optimum crop yield by the phosphorus removal rate of the harvested crop.
b. Phosphorus removal by the crop schedule shall be determined by summing the phosphorus crop removal values determined in 65.17(19)*"a"* for each crop in the crop schedule.
c. The phosphorus applied over the duration of the crop schedule shall be less than or equal to the phosphorus removed with harvest during that crop schedule as calculated in 65.17(19)*"b"* unless additional phosphorus is recommended by soil tests and Iowa State University extension publication PM 1688, "General Guide for Crop Nutrient Recommendations in Iowa."
d. Additional requirements for phosphorus-based rates.
(1) No single manure application shall exceed the nitrogen-based rate of the planned crop receiving the particular manure application.
(2) No single manure application shall exceed the rate that applies to the expected amount of phosphorus removed with harvest by the next four anticipated crops in the crop schedule.
e. If the actual crop schedule differs from the planned crop schedule, then any surplus or deficit of phosphorus shall be accounted for in the subsequent manure application.
f. Phosphorus in manure should be considered 100 percent available unless soil phosphorus concentrations are below optimum levels for crop production. If soil phosphorus concentrations are below optimum levels for crop production phosphorus availability, values suggested in Iowa State University extension publication PM 1811, "Managing Manure Nutrients for Crop Production" or other credible sources shall be used.